

invention in relation with the reactor shown in Figure 1. Particularly, at page 8, lines 1-11 the present application states:

Referring to Figure 4, in accordance with one embodiment of the present invention, and to obtain the benefits of reduced control rods and control rod drives, without suffering the problems associated with large fuel bundles 80 identified above, substantially standard size fuel bundles 36 and large control rods 76 are utilized in core 22. Particularly, nuclear reactor core 22 includes large control rods 76 and conventional size fuel bundles 36. Each large control rod 76 is sized to provide poison control for sixteen conventional size fuel bundles 36. Conventional size fuel assemblies 36 and large control rods 76 are arranged in a F-lattice configuration 94 to facilitate minimizing the number of control rod drives and control rods. F-lattice configuration 94 has large control rods 76 in staggered rows 96 with sixteen conventional fuel bundles 36 surrounding each large control rod 76.

Accordingly, Applicants respectfully request that the requirement to label Figure 1 as "Prior Art" be withdrawn.

The rejection of Claims 1, 4, and 5 under 35 U.S.C. § 102(b) as being anticipated by Figures 1-3 of the present application is respectfully traversed.

Claim 1 recites a core for a nuclear reactor that includes a plurality of fuel bundles and a plurality of large control rods. Each control rod includes four control rod blades extending radially from a central portion and arranged at right angles to each other. The blades define four fuel bundle receiving channels, and the control rods are arranged in a plurality of staggered rows with only four fuel bundles in each receiving channel.

Applicants submit that Figures 1-3 do not show or suggest a core for a nuclear reactor as recited in Claim 1. Particularly, Figures 1-3 do not show or suggest a core with the control rods having four fuel bundle receiving channels with four fuel bundles in each receiving channel. Rather, Figure 2 shows a conventional configuration of control rods and fuel bundles of a reactor

core. The control rods include four control rod blades arranged at right angles to each other which define four fuel bundle receiving channels around the control rod. Each receiving channel is sized to receive one fuel bundle. Also, Figure 3 shows a L-lattice configuration with large control rods in staggered rows. Each large control rod includes four blades arranged at right angles to each other which define four fuel bundle receiving channels around the control rod. Each receiving channel includes one large fuel bundle. As explained above, Figure 1 is not prior art. Accordingly, Claim 1 is patentable over Figures 1-3 of the present application.

Claims 4 and 5 depend from independent Claim 1. When the recitations of dependent Claims 4 and 5 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claims 4 and 5 likewise are patentable over Figures 1-3 of the present application.

For the reasons set forth above, Applicants respectfully request that the Section 102(b) rejection of Claims 1, 4, and 5 be withdrawn.

The rejection of Claims 1-13 under 35 U.S.C. § 102(b) as being anticipated by Sakurai et al. (JP 04-301596) is respectfully traversed.

Applicants submit that Sakurai et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 1. Particularly, Sakurai et al. do not describe nor suggest that the control rods are arranged in a plurality of staggered rows with only four fuel bundles in each receiving channel.

As best understood, it appears that Sakurai et al. teach a large sized fuel assembly with a control rod having four control rod blades at right angles to each other. The Office Action refers to Figure 2 and suggests that the control rods are arranged in staggered rows. Applicants

disagree with this suggestion and submit that Examiner cannot know what Sakurai et al. teach without a translation of the patent. Applicants submit that it appears that the control rods are arranged in even rows and that only some of the control rods are shown because it appears that there are too few control rods for the number of fuel bundles shown in Figure 2. Accordingly, Applicants submit that Claim 1 is patentable over Sakurai et al.

Claim 3 has been canceled.

Claims 2, 4, and 5 depend from independent Claim 1. When the recitations of dependent Claims 2, 4, and 5 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claims 2, 4, and 5 likewise are patentable over Sakurai et al.

Claim 6 of the present application recites a core for a nuclear reactor that includes a plurality of fuel cells. Each fuel cell including a large control rod comprising four control rod blades extending radially from a central portion and arranged at right angles to each other. The blades defining four quadrants of the fuel cell, each quadrant consisting of only four fuel bundles. The plurality of fuel cells are arranged so that the control rods are in a staggered row pattern where each side of each quadrant of a fuel cell is adjacent to a control rod blade.

Sakurai et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 6. Particularly, Sakurai et al. do not describe nor suggest a core where the plurality of fuel cells are arranged so that the control rods are in a staggered row pattern where each side of each quadrant of a fuel cell is adjacent to a control rod blade. As explained above, Applicants submit that it appears that the control rods shown in Figure 2 of Sakurai et al. are arranged in even rows and that only some of the control rods are shown because it appears that there are too few control rods for the number of fuel bundles shown in Figure 2. *Arguendo*, if one assumes that the

Sakurai et al. control rods are in staggered rows, Sakurai et al. does not describe nor suggest that each quadrant of a fuel cell is adjacent a control rod blade. Accordingly, Applicants submit that Claim 6 is patentable over Sakurai et al.

Claim 7 has been canceled.

Claims 8-9 depend from independent Claim 6. When the recitations of dependent Claims 8-9 are considered in combination with the recitations of Claim 6, Applicants respectfully submit that Claims 8-9 likewise are patentable over Sakurai et al.

Claim 10 of the present application recites a nuclear reactor core configuration where the core includes a plurality of fuel bundles and a plurality of large control rods. Each control rod includes four control rod blades extending radially from a central portion and arranged at right angles to each other with the blades defining four fuel bundle receiving channels. The configuration comprising the plurality of large fuel bundles arranged in a staggered row pattern, and the fuel bundles arranged with only four fuel bundles in each receiving channel.

Applicants submit that Sakurai et al. do not describe nor suggest a nuclear reactor core configuration as recited in Claim 10. Particularly, Sakurai et al. do not describe nor suggest that the control rods are arranged in a plurality of staggered rows with only four fuel bundles in each receiving channel. As explained above, the Office Action refers to Figure 2 and suggests that the control rods are arranged in staggered rows. Applicants disagree with this suggestion and submit that Examiner cannot know what Sakurai et al. teach without a translation of the patent.

Applicants submit that it appears that the control rods are arranged in even rows and that only some of the control rods are shown because it appears that there are too few control rods for the

number of fuel bundles shown in Figure 2. Accordingly, Applicants submit that Claim 10 is patentable over Sakurai et al.

Claim 11 has been canceled.

Claims 12-13 depend from independent Claim 10. When the recitations of dependent Claims 12-13 are considered in combination with the recitations of Claim 10, Applicants respectfully submit that Claims 12-13 likewise are patentable over Sakurai et al.

For the reasons set forth above, Applicants respectfully request that the Section 102(b) rejection of Claims 1-13 be withdrawn.

The rejection of Claims 1, 2, 4-6, 8-10, 12, and 13 under 35 U.S.C. § 102(b) as being anticipated by Yamashita et al. is respectfully traversed.

Applicants submit that Yamashita et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 1. Particularly, Yamashita et al. do not describe nor suggest that the control rods are arranged in a plurality of staggered rows with only four fuel bundles in each receiving channel. As best understood, it appears that Yamashita et al. teach a nuclear reactor core with square and rectangular grids with eight fuel bundles in each grid. Accordingly, Applicants submit that Claim 1 is patentable over Yamashita et al.

Claim 3 has been canceled.

Claims 2, 4, and 5 depend from independent Claim 1. When the recitations of dependent Claims 2, 4, and 5 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claims 2, 4, and 5 likewise are patentable over Yamashita et al.

Yamashita et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 6. Particularly, Yamashita et al. do not describe nor suggest a core where the blades of a

control rod define four quadrants of a fuel cell and each quadrant contains only four fuel bundles. As best understood, it appears that Yamashita et al. teach a nuclear reactor core with square and rectangular grids with eight fuel bundles in each grid. Accordingly, Applicants submit that Claim 6 is patentable over Yamashita et al.

Claim 7 has been canceled.

Claims 8-9 depend from independent Claim 6. When the recitations of dependent Claims 8-9 are considered in combination with the recitations of Claim 6, Applicants respectfully submit that Claims 8-9 likewise are patentable over Yamashita et al.

Applicants submit that Yamashita et al. do not describe nor suggest a nuclear reactor core configuration as recited in Claim 10. Particularly, Yamashita et al. do not describe nor suggest that the control rods are arranged in a plurality of staggered rows with only four fuel bundles in each receiving channel. As best understood, it appears that Yamashita et al. teach a nuclear reactor core with square and rectangular grids with eight fuel bundles in each grid. Accordingly, Applicants submit that Claim 10 is patentable over Yamashita et al.

Claim 11 has been canceled.

Claims 12-13 depend from independent Claim 10. When the recitations of dependent Claims 12-13 are considered in combination with the recitations of Claim 10, Applicants respectfully submit that Claims 12-13 likewise are patentable over Yamashita et al.

For the reasons set forth above, Applicants respectfully request that the Section 102(b) rejection of Claims 1, 2, 4-6, 8-10, 12, and 13 be withdrawn.

The rejection of Claims 1-13 under 35 U.S.C. § 103(a) as being unpatentable over Sakurai et al. in view of Figures 1-3 of the present application is respectfully traversed.

As explained above, Sakurai et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 1, nor a core for a nuclear reactor as recited in Claim 6, nor a nuclear reactor core configuration as recited in Claim 10. Accordingly, Applicants submit that independent Claims 1, 6, and 10 are patentable over Sakurai et al. Also, as explained above, Figures 1-3 of the present application do not describe nor suggest a core for a nuclear reactor as recited in Claim 1.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been an obvious to one of ordinary skill in the art to modify Sakurai et al. according to the teachings of Figures 1-3 of the present application. More specifically, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Neither Sakurai et al. nor Figures 1-3 describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine Sakurai et al. with Figures 1-3 because there is no motivation to combine the references suggested in the art. Rather, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicants' own teaching. Only the conclusory statement that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the known boiling water reactor core designs into the reactor core configuration of Sakurai et al...." suggests combining the disclosures. Accordingly, Applicants respectfully submit that there is no suggestion or motivation to combine Sakurai et al. with Figures 1-3 of the present application.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levingood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck , 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Further, Applicants submit that Sakurai et al. and Figures 1-3 of the present application, alone or in combination, do not describe nor suggest a core for a nuclear reactor as recited in Claim 1, nor a core for a nuclear reactor as recited in Claim 6, nor a nuclear reactor core configuration as recited in Claim 10. Applicants submit substituting the reactor core designs of Figures 2 and 3 for the reactor core designs of Sakurai et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 1, nor a core for a nuclear reactor as recited in Claim 6, nor a nuclear reactor core configuration as recited in Claim 10. Accordingly, Applicants submit that independent Claims 1, 6, and 10 are patentable over Sakurai et al. and Figures 1-3 of the present application, alone or in combination.

Claims 3, 7, and 11 have been canceled.

Claims 2, 4, and 5 depend from independent Claim 1, Claims 8-9 depend from independent Claim 6, and Claims 12-13 depend from independent Claim 10. When the recitations of dependent Claims 2, 4, and 5, and Claims 8-9, and Claims 12-13 are considered in combination with the recitations of Claims 1, 6, and 10 respectively, Applicants respectfully

submit that Claims 2, 4, 5, 8-9, and 12-13 likewise are patentable over Sakurai et al. and Figures 1-3 of the present application, alone or in combination.

For the reasons set forth above, Applicants respectfully request that the Section 103(a) rejection of Claims 1-13 be withdrawn.

The rejection of Claims 1-13 under 35 U.S.C. § 103(a) as being unpatentable over Yamashita et al. in view of Figures 1-3 of the present application is respectfully traversed.

As explained above, Yamashita et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 1, nor a core for a nuclear reactor as recited in Claim 6, nor a nuclear reactor core configuration as recited in Claim 10. Accordingly, Applicants submit that independent Claims 1, 6, and 10 are patentable over Yamashita et al. Also, as explained above, Figures 1-3 of the present application do not describe nor suggest a core for a nuclear reactor as recited in Claim 1.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been an obvious to one of ordinary skill in the art to modify Yamashita et al. according to the teachings of Figures 1-3 of the present application. More specifically, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Neither Yamashita et al. nor Figures 1-3 describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine Yamashita et al. with Figures 1-3 because there is no motivation to combine the references suggested in the

art. Rather, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicants' own teaching. Only the conclusory statement that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the known boiling water reactor core designs into the reactor core configuration of Yamashita et al...." suggests combining the disclosures. Accordingly, Applicants respectfully submit that there is no suggestion or motivation to combine Yamashita et al. with Figures 1-3 of the present application.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levingood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck , 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Further, Applicants submit that Yamashita et al. and Figures 1-3 of the present application, alone or in combination, do not describe nor suggest a core for a nuclear reactor as recited in Claim 1, nor a core for a nuclear reactor as recited in Claim 6, nor a nuclear reactor core configuration as recited in Claim 10. Applicants submit substituting the reactor core designs of Figures 2 and 3 for the reactor core designs of Yamashita et al. do not describe nor suggest a core for a nuclear reactor as recited in Claim 1, nor a core for a nuclear reactor as recited in Claim 6, nor a nuclear reactor core configuration as recited in Claim 10. Accordingly,

Applicants submit that independent Claims 1, 6, and 10 are patentable over Yamashita et al. and Figures 1-3 of the present application, alone or in combination.

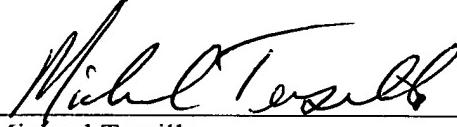
Claims 3, 7, and 11 have been canceled.

Claims 2, 4, and 5 depend from independent Claim 1, Claims 8-9 depend from independent Claim 6, and Claims 12-13 depend from independent Claim 10. When the recitations of dependent Claims 2, 4, and 5, and Claims 8-9, and Claims 12-13 are considered in combination with the recitations of Claims 1, 6, and 10 respectively, Applicants respectfully submit that Claims 2, 4, 5, 8-9, and 12-13 likewise are patentable over Yamashita et al. and Figures 1-3 of the present application, alone or in combination.

For the reasons set forth above, Applicants respectfully request that the Section 103(a) rejection of Claims 1-13 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Favorable action is respectfully solicited.

Respectfully submitted,



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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Challberg et al.

Serial No.: 09/597,113

Filed: June 20, 2000

For: CORE CONFIGURATION FOR A
NUCLEAR REACTOR

: Art Unit: 3641

: Examiner: J. Keith

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SUBMISSION OF MARKED UP CLAIMS

Hon. Commissioner for Patents
Washington, D.C. 20231

A marked-up version of amended Claims 1, 6 and 10, in accordance with 37 C.F.R. § 1.121(c)(1)(ii), follows below.

MARKED UP CLAIMS

1. (amended) A core for a nuclear reactor comprising:

a plurality of fuel bundles; and

a plurality of large control rods, each said control rod comprising four control rod blades extending radially from a central portion and arranged at right angles to each other, said blades defining four fuel bundle receiving channels, said control rods arranged in a plurality of staggered rows with [a plurality of] only four fuel bundles in each said receiving channel.

6. (amended) A core for a nuclear reactor comprising a plurality of fuel cells, each said fuel cell comprising;

a large control rod comprising four control rod blades extending radially from a central portion and arranged at right angles to each other, said blades defining four quadrants of said fuel cell, each said quadrant [comprising a plurality of] containing only four fuel bundles; said plurality of fuel cells arranged so that said control rods are in a staggered row pattern where each side of each said quadrant of a fuel cell is adjacent to a control rod blade.

10. (amended) A nuclear reactor core configuration, said core comprising a plurality of fuel bundles and a plurality of large control rods, each said control rod comprising four control rod blades extending radially from a central portion and arranged at right angles to each other, said blades defining four fuel bundle receiving channels, said configuration comprising:
said plurality of large fuel bundles arranged in a staggered row pattern; and
said fuel bundles arranged with [a plurality of] only four fuel bundles in each said receiving channel.

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